

REMARKS

Claims 1-10 and 12-35 are rejected. Claim 36 is allowed. Claim 11 is objected to. Claims 1-36 are presently pending in the application. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

The Applicants thank the Examiner for the indication that Claim 36 is allowed.

Rejection Of Claims 1-6, 16-22 and 26-35 Under 35 U.S.C. §103(a):

Claims 1-6, 16-22 and 26-35 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kobayashi (2002/0005827), as regarding claims 1 and 26, Kobayashi discloses an apparatus and a method for writing an image on a liquid crystal display of the type having a layer of cholesteric liquid crystal material disposed between a pair of unpatterned conductors and a light absorbing layer for forming an image wise pattern in response to an image wise pattern of light, comprising: means for applying a first voltage to the conductors; means for applying a second voltage different from the first voltage to the conductors after applying the first voltage, wherein the first and second voltages are non-zero (Figs. 1 and 2; [0068] to [0073]); and means for exposing the liquid crystal display to the image wise pattern of light, and, although Kobayashi does not explicitly disclose the wise pattern is a wise thermal pattern, Kobayashi discloses forming the image wise pattern in response to an image wise pattern of light. The Examiner indicates that, since the light is generated from a light source which generates heat at the time, it would have been obvious to one of ordinary skill in the art that the image wise pattern is an image wise thermal pattern. In addition, Kobayashi does not disclose the applied voltages being RMS voltages, however, the Examiner takes Official Notice that applying RMS voltages to a liquid crystal display is old and well known in the art, making it obvious to one of ordinary skill in the art to use RMS voltages first and second voltages in Kobayashi's apparatus because the RMS voltages allow the display to generate acute images.

Kobayashi discloses a photo-addressable type recording display apparatus with a recording unit that displays an image, a light writing unit that writes an image in the recording unit by the pattern of light, and a control unit that

controls the recording unit and the light writing unit. The recording unit is provided with a spatial light modulation element and a driving unit, and the spatial light modulation element has a memory liquid crystal display element layer and organic photoconductive switching element layer. The control unit determines the magnitude and the application time of a voltage that is applied on the spatial light modulation element by the driving unit so that the threshold voltage corresponds to the voltage waveform determined correspondingly to the comparative magnitude relation between the time constant D of the liquid crystal display element layer and the time constant S of the organic photoconductive switching element layer during non-irradiation with light and irradiation with light by the light writing unit, and supplies a trigger signal for driving waveform output to the driving unit.

The present invention relates to a method of writing an image on a liquid crystal display of the type having a layer of cholesteric liquid crystal material disposed between a pair of unpatterned conductors and a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, comprising a) applying a first RMS voltage to the conductors; b) applying a second RMS voltage different from the first RMS voltage to the conductors after applying the first RMS voltage, wherein the first and second RMS voltages are non-zero; and c) exposing the liquid crystal display to the image wise pattern of light. The present invention also relates to an apparatus for writing an image on a liquid crystal display of the type having a layer of cholesteric liquid crystal material disposed between a pair of unpatterned conductors and a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, comprising: a) means for applying a first RMS voltage to the conductors; b) means for applying a second RMS voltage different from the first voltage to the conductors after applying the first RMS voltage, wherein the first and second RMS voltages are non-zero; and c) means for exposing the liquid crystal display to the image wise pattern of light.

To establish a prima facie case of obviousness requires, first, there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when

combines) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998).

The present invention relates to a method of writing an image on a cholesteric liquid crystal display by applying at least two different RMS voltages. See pg. 14, lines 14-16 and Fig. 11B. Kobayashi discloses the repeated use of a single voltage. See [0068] (“*FIG. 1A to FIG. 1E show the conceptual diagram of the voltage applied to the display element layer corresponding to the voltage applied to the light switching element layer in the case that the display element layer and the light switching element layer are connected each other in series. FIG. 1A to FIG. 1E show diagrams of the voltage waveform that is applied to the display element layer obtained when 5 rectangular pulses are applied, respectively.*”) and Fig. 1; [0217] (“*Simultaneously, 4 rectangular waveform pulses of 50 Hz and 280 V was applied by the driving pulse generation unit 29*”); [0193] (“*Simultaneously, 4 rectangular waveform pulses of 50 Hz and 300 V was applied by the driving pulse generation unit 29*”). In addition, the present invention requires a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, not a photo-conductive layer. Pg. 15, line 11. Kobayashi discloses a photoconductive layer, which produces a voltage effect on the liquid crystal when illuminated, not a thermal response. Kobayashi also fails to disclose or suggest the use of the thermal pattern effects on a cholesteric liquid crystal layer. [0063] (“*the light switching element layer formed of photoconductive material is used, the driving control unit controls the quantity of light for irradiation incident from the light irradiation unit, the charge quantity generated in the light switching element layer correspondingly to the quantity of light is controlled to thereby change the resistance component of the switching element layer*”); [0067] (“*In the case that a pulse is applied when the display element layer and the light switching element layer are connected each other in series, the voltage waveform applied to the display element layer is not rectangular though a rectangular pulse is applied. The reason is that each of the display element layer and the light switching layer can be almost regarded as a circuit having the resistance component and the capacitance component that are connected in parallel, and in the case that such circuits are connected in series,*

the capacitance division that is dependent of the capacitance component is predominant at first, but the resistance division that is dependent of the resistance component becomes predominant with elapse of time.”); [0068] (“FIG. 1A to FIG. 1E show the conceptual diagram of the voltage applied to the display element layer corresponding to the voltage applied to the light switching element layer in the case that the display element layer and the light switching element layer are connected each other in series.”). Therefore, the reference to Kobayashi fails to suggest or disclose the required application of multiple differing voltages or a light absorbing layer for forming a specifically thermal pattern.

The reference provides no likelihood of success. The present invention provides improvement with respect to image quality when multiple electrical fields are applied to the cholesteric liquid crystal when it is at elevated temperature. Pg. 13, lines 3-6(*“Images can be formed using only energy from the flash unit, however image quality is significantly improved by the application of an electrical field at elevated temperatures experienced during thermal pulse 105”*); pg. 16, lines 3-8 (*“The short, high voltage pulses of excitation pulse 110 applied during the peak temperature of thermal pulse 105 created high contrast, high brightness images using STN displays poorer energy modulation than mask 54. The image quality of STN masked images was improved over drive schemes using low voltage, long time period electrical drive schemes referenced in Fig. 4 and Fig. 5.”*). Kobayashi fails to disclose either the application of multiple, differing electrical fields and fail to mention the use of a liquid crystal at elevated temperature, let alone a combination of the two. As a result Kobayashi fails to provide any likelihood of success in improving image quality through the application of multiple electrical fields a cholesteric liquid crystal at elevated temperature.

The reference also fails to provide all the limitations of the present claims, specifically with respect to the application of multiple, differing voltages and a light absorbing layer for forming an image wise thermal pattern.

Since the reference fails to disclose, teach or suggest the modification necessary to produce the present invention, fails to provide any likelihood of success, and fails to include all the limitation of the present claims, the Applicants therefore request that the Examiner reconsider and withdraw the rejection.

Claims 2-4 and 27, 5 and 28, 6 and 29, 16, 17-19, and 30-32, 20 and 33, 21 and 34, 22 and 35 benefit from dependence on claims 1 and 26, which, as discussed above, Applicants believe are nonobvious with respect to the references.

Rejection Of Claims 7-10, 12-15 and 23-25 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 7-10, 12-15 and 23-25 under 35 U.S.C. §103(a) as being unpatentable over Kobayashi as applied to claims 1-6, 16-22 and 26-35 above, and further in view of Yang et al. (6154190), as, although Kobayashi does not disclose a third, fourth, and fifth voltages, Yang, in the same display field, discloses an apparatus and a method for writing an image on a liquid crystal display comprising a third, fourth, and fifth voltages and each of the voltages is different from each other, making it obvious to one of ordinary skill in the art to use Yang's voltages in Kobayashi's apparatus for writing an image on the liquid crystal display because it allows the apparatus to generate different image signals.

Kobayashi discloses a photo-addressable type recording display apparatus with a recording unit that displays an image, a light writing unit that writes an image in the recording unit by the pattern of light, and a control unit that controls the recording unit and the light writing unit. The recording unit is provided with a spatial light modulation element and a driving unit, and the spatial light modulation element has a memory liquid crystal display element layer and organic photoconductive switching element layer. The control unit determines the magnitude and the application time of a voltage that is applied on the spatial light modulation element by the driving unit so that the threshold voltage corresponds to the voltage waveform determined correspondingly to the comparative magnitude relation between the time constant D of the liquid crystal display element layer and the time constant S of the organic photoconductive switching element layer during non-irradiation with light and irradiation with light by the light writing unit, and supplies a trigger signal for driving waveform output to the driving unit.

Yang discloses flat-panel liquid crystal display including a flat sheet of bistable chiral nematic liquid crystal material activated by a drive circuit that individually controls the display state of multiple picture elements. The driver circuitry activates the liquid crystal domains with various drive schemes,

which have any number of different phases to attain various addressing sequence times. At the end of each drive scheme, the texture of the liquid crystal material is allowed to provide either focal conic or twisted planar end states across the two-dimensional array of picture elements. Each drive scheme employs at least a preparation phase and a selection phase to predispose the liquid crystal material to one of the end states.

The present invention relates to a method of writing an image on a liquid crystal display of the type having a layer of cholesteric liquid crystal material disposed between a pair of unpatterned conductors and a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, comprising a) applying a first RMS voltage to the conductors; b) applying a second RMS voltage different from the first RMS voltage to the conductors after applying the first RMS voltage, wherein the first and second RMS voltages are non-zero; and c) exposing the liquid crystal display to the image wise pattern of light. The present invention also relates to an apparatus for writing an image on a liquid crystal display of the type having a layer of cholesteric liquid crystal material disposed between a pair of unpatterned conductors and a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, comprising: a) means for applying a first RMS voltage to the conductors; b) means for applying a second RMS voltage different from the first voltage to the conductors after applying the first RMS voltage, wherein the first and second RMS voltages are non-zero; and c) means for exposing the liquid crystal display to the image wise pattern of light.

To establish a prima facie case of obviousness requires, first, there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combines) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998).

The present invention requires a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light, not a

photo-conductive layer. Pg. 15, line 11. As discussed above, Kobayashi discloses a photoconductive layer, which produces a voltage effect on the liquid crystal when illuminated, not a thermal response. Kobayashi also fails to disclose or suggest the use of the thermal pattern effects on a cholesteric liquid crystal layer. Yang also is silent with respect to a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light and the use of the thermal pattern effects on a cholesteric liquid crystal layer. Therefore, Kobayashi and Yang fail to suggest or disclose a light absorbing layer for forming a specifically thermal pattern.


The reference provides no likelihood of success. The present invention provides improvement with respect to image quality when multiple electrical fields are applied to the cholesteric liquid crystal when it is at elevated temperature. Pg. 13, lines 3-6(*"Images can be formed using only energy from the flash unit, however image quality is significantly improved by the application of an electrical field at elevated temperatures experienced during thermal pulse 105"*); pg. 16, lines 3-8 (*"The short, high voltage pulses of excitation pulse 110 applied during the peak temperature of thermal pulse 105 created high contrast, high brightness images using STN displays poorer energy modulation than mask 54. The image quality of STN masked images was improved over drive schemes using low voltage, long time period electrical drive schemes referenced in Fig. 4 and Fig. 5."*). Kobayashi fails to disclose the use of a liquid crystal at elevated temperature, or a combination involving the application of multiple, differing electrical fields with a light absorbing layer for forming a specifically thermal pattern. Yang also fails to mention a light absorbing layer for forming an image wise thermal pattern in response to an image wise pattern of light and the use of the thermal pattern effects on a cholesteric liquid crystal layer. As a result, Yang and Kobayashi fail to provide any likelihood of success in improving image quality through the application of multiple electrical fields a cholesteric liquid crystal at elevated temperature or even the use of a liquid crystal at elevated temperature, or a combination involving the application of multiple, differing electrical fields with a light absorbing layer for forming a specifically thermal pattern.

The references also fail to provide all the limitations of the present claims, specifically with respect to a light absorbing layer for forming an image wise thermal pattern.

Since the reference fails to disclose, teach or suggest the modification necessary to produce the present invention, fails to provide any likelihood of success, and fails to include all the limitation of the present claims, the Applicants therefore request that the Examiner reconsider and withdraw the rejection.

It is believed that the foregoing is a complete response to the Office Action and that the claims are in condition for allowance. Applicants respectfully request early allowance to obviate the appeal.

Respectfully submitted,


Attorney for Applicants
Registration No. 42,334

Lynne M. Blank/ct
Rochester, NY 14650
Telephone: 585-477-7418
Facsimile: 585-477-1148

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.